

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA, SAN FRANCISCO DIVISION

WAYMO LLC,
Plaintiff,

VS.

UBER TECHNOLOGIES, INC.;
OTTOMOTTO LLC; OTTO TRUCKING
LLC,

Defendants.

CASE NO. 3:17-cv-00939

**REPLY DECLARATION OF GREGORY
KINTZ**

**REDACTED VERSION OF DOCUMENT
SOUGHT TO BE SEALED**

1 I, Gregory Kintz, hereby declare as follows.

2 1. I have been asked by counsel for Waymo LLC (“Waymo”) to provide an opinion as to
 3 whether Defendant Ottomotto LLC (“OttoMotto”), Defendant Otto Trucking LLC (“Otto Trucking”),¹
 4 or Defendant Uber Technologies, Inc. (“Uber”, and collectively, “Defendants”), through the accused
 5 LiDAR devices, infringe United States Patent Nos. 8,836,922 (“the ’922 Patent”) and 9,285,464 (“the
 6 ’464 Patent) (collectively, “the Asserted Patents”). I have also been asked to provide an opinion on
 7 Waymo’s trade secrets incorporated into the accused LiDAR devices. The analysis and opinions
 8 contained in this declaration are based on the information currently available to me. I reserve the right
 9 to supplement and amend my opinions after further discovery.

10 2. In addition to the materials I considered in my Original Declaration, I have considered
 11 the following materials for this Reply Declaration:

- 12 • Transcripts of depositions taken pursuant to the Court’s order regarding expedited
 13 discovery (Dkt No. 61);
- 14 • Documents produced by the parties pursuant to the Court’s order regarding
 15 expedited discovery (Dkt No. 61);
- 16 • Defendant’s opposition to Waymo’s preliminary injunction, including the
 17 supporting declarations and materials cited therein;
- 18 • A physical inspection of Defendants’ Fuji LiDAR device and Owl LiDAR device;
- 19 • Photographs taken from an inspection of Defendants’ [REDACTED] LiDAR device.

20 **I. TRADE SECRETS DISCUSSED IN MY ORIGINAL DECLARATION**

21 3. In this section I address trade secrets discussed in my Original Declaration.
 22 Specifically, I respond in relevant part to the declarations of Drs. Paul McManamon and Michael
 23 Lebby, and also discuss evidence that has become available since I submitted my Original
 24 Declaration.

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27 ¹ OttoMotto and Otto Trucking are sometimes collectively referred to as “Otto.”

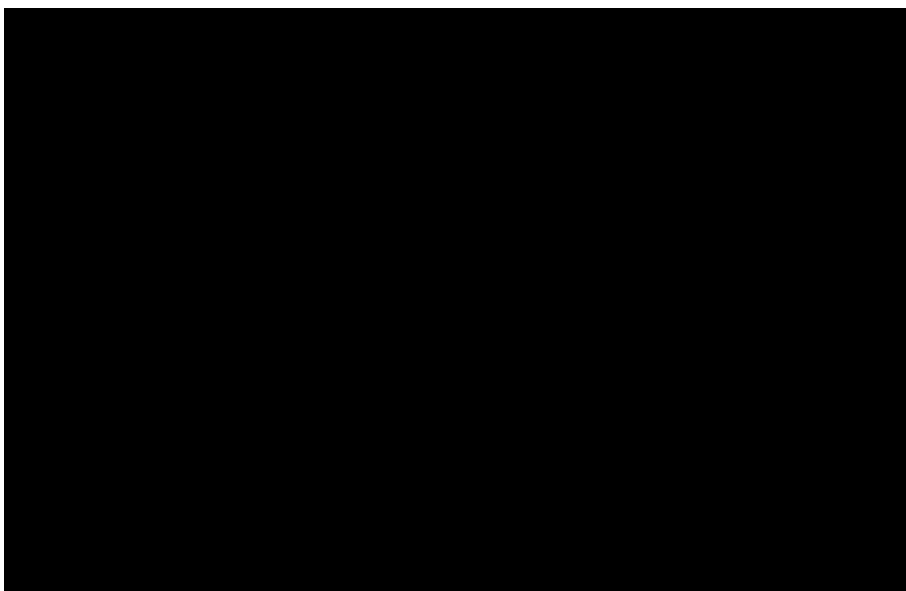
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4. As I wrote in my Original Declaration (Kintz Decl. ¶¶ 29-35), Waymo's GBr3 features [REDACTED] [REDACTED] [REDACTED]. The [REDACTED] results in a [REDACTED] [REDACTED] in the field of view that [REDACTED] and a [REDACTED] [REDACTED] in the field of view that [REDACTED]. In addition, each diode is [REDACTED]. These design features improve the "vision" of the LiDAR system by [REDACTED] [REDACTED]. Further, the Fuji PCB incorporates the [REDACTED] concept of GBr3.

5. ***Use by Defendants.*** My visual inspection of the Fuji device on April 11, 2017 confirmed that the Fuji device features [REDACTED] [REDACTED] [REDACTED]. Like the GBr3 device, the [REDACTED] in the Fuji device results in a [REDACTED] [REDACTED] that [REDACTED] and a [REDACTED] [REDACTED] are used in the field of view that [REDACTED]. Below are photographs from my physical inspection that illustrate this specific [REDACTED].



1 (Jaffe Reply Decl. Ex. 93, UBER00006245.)

2 6. Neither Dr. McManamon nor Dr. Lebby denies that the Fuji system uses this
 3 design. Documentary evidence produced by Uber confirms that the Fuji device features [REDACTED]

4 [REDACTED]
 5 [REDACTED]
 6 [REDACTED]. Exhibit B to Mr. Haslim's declaration shows the [REDACTED]

7 [REDACTED] in the Fuji device, referenced to [REDACTED]

8 [REDACTED]. (Haslim Decl. Ex. B.) Using [REDACTED] as an example, the [REDACTED]
 9 between [REDACTED]. (*Id.*)

10 7. *Qualification as Trade Secret.* Dr. McManamon cites two references that he
 11 opines disclose [REDACTED] that Waymo claims as a trade secret.
 12 However, as most clearly stated in Trade Secret No. 1, [REDACTED]

13 [REDACTED]
 14 [REDACTED]
 15 [REDACTED]
 16 [REDACTED] (TS List No. 1.) Neither of Dr.

17 McManamon's two cited references discloses this feature.

18 8. Dr. McManamon's first cited reference is Mundhenk et al., "PanDAR: A wide-
 19 area, frame-rate, and full color LIDAR with foveated region using backfilling interpolation
 20 upsampling." Dr. McManamon claims that this is an application of the well-known optical
 21 concept called foveated vision. I agree that PanDAR implements the concept of foveated vision,
 22 *i.e.*, the concept of "[h]aving greater resolution in the middle of the field of view." (McManamon
 23 Decl. ¶ 51.) The PanDAR system, however, achieved this by stacking two Velodyne 32E LiDAR
 24 systems on top of each other, resulting in more beams in the middle of the field of view. This is
 25 distinct from an approach in which [REDACTED]

26 [REDACTED]
 27 [REDACTED]. Indeed, Dr.

1 McManamon agreed at his deposition that the approach taught by the PanDAR system did not use
 2 Waymo's [REDACTED] approach:

3 [REDACTED]
 4 [REDACTED]
 5 [REDACTED]
 6 [REDACTED]
 7 [REDACTED]
 8 [REDACTED]
 9 [REDACTED]
 10 [REDACTED]
 11 [REDACTED]

12 (Jaffe Reply Decl. Ex. 83, 4/19/2017 McManamon Depo. Tr. 57:25-58:14.) Adding further
 13 support to my opinion that the "dual stacked" Velodyne approach used by the PanDAR system is
 14 distinct from Waymo's [REDACTED] is the fact that [REDACTED]
 15 [REDACTED] in favor of the [REDACTED]
 16 approach misappropriated from Waymo. (See Boehmke Decl. ¶¶ 9-11, 14-16, Ex. H at 5.)

17 9. Unlike the design taught by the PanDAR reference, Waymo's [REDACTED]
 18 [REDACTED], resulting in
 19 [REDACTED], not at the middle of the field of view as
 20 would be the case if Waymo had just been applying the principle of foveated vision. Accordingly,
 21 I disagree with Dr. McManamon that this trade secret is simply an implementation of foveated
 22 vision. Instead, it is one of Waymo's particular solutions to the problem of sensing for self-
 23 driving car applications.

24 10. Dr. McManamon also relies on U.S. Patent No. 8,767,190 to Velodyne. However,
 25 this patent discloses placing one laser diode per PCB and mounting 32 PCBs on a frame, with
 26 even angular spacing between each laser diode. It then teaches varying the overall beam density
 27 of the system "by simply removing or not installing any desired number of emitter/detector pairs."
 28 ('190 patent at 6:49-50.) The patent does not teach [REDACTED]

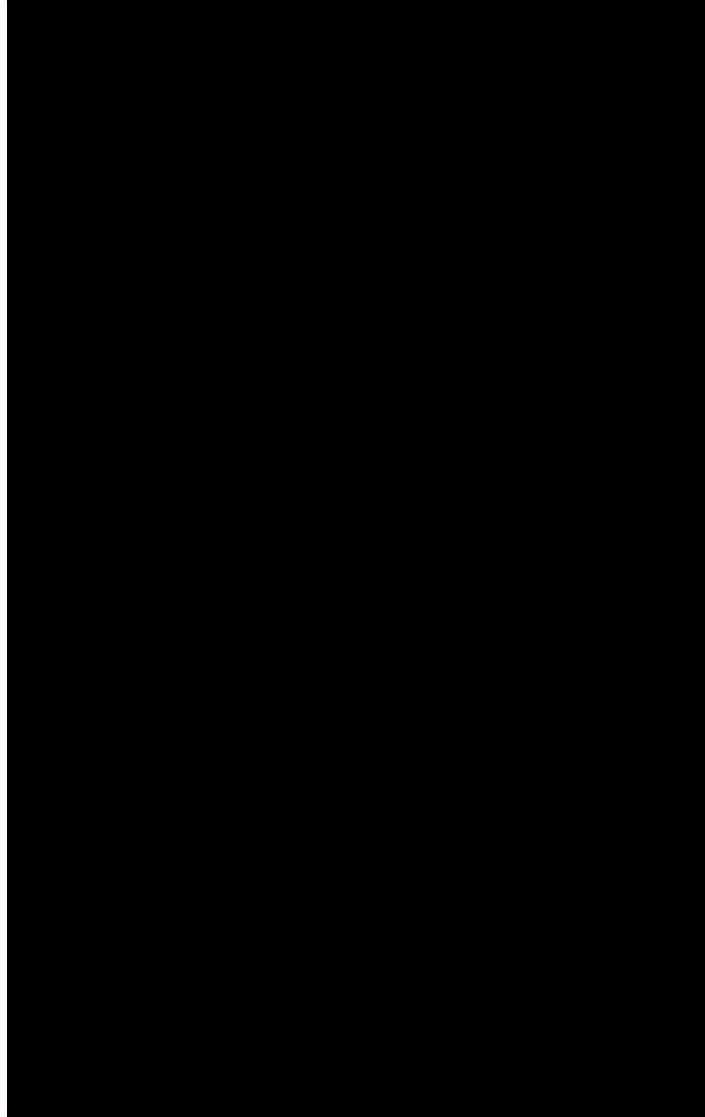
1 [REDACTED]; rather, it simply says that in some applications the designer may want
2 to save costs by reducing the overall number of emitter/detector pairs that the system employs. It
3 does not say that the density should be adjusted to [REDACTED] and it does
4 not teach any other specific pattern. The patent also recognizes that reducing the overall density
5 reduces the vertical resolution of the system, which the '190 patent explains may be acceptable for
6 some applications that do not require high resolution but require cheaper sensors. ('190 patent at
7 6:50-52.) The '190 patent therefore is best understood as teaching a tradeoff between overall
8 system resolution and cost. By contrast, Waymo's solution [REDACTED]

9 [REDACTED]
10 [REDACTED]
11 [REDACTED] At his deposition, Dr. McManamon
12 admitted that he did not cite a specific disclosure from the '190 patent describing [REDACTED]
13 [REDACTED]. (Jaffe Reply Decl. Ex. 83, 4/19/2017 McManamon Depo. Tr. 61:9-12.)

14 11. Dr. McManamon's annotated Figure 5 of the '190 patent, at paragraph 57 of his
15 declaration and reproduced below, does not appear in the patent itself and does not correspond to
16 any specific embodiment disclosed by the patent. Rather, Dr. McManamon has simply attempted
17 to use hindsight to annotate Figure 5 so that it superficially resembles the [REDACTED]
18 [REDACTED].

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19 12. Dr. McManamon's annotated Figure 5 also does not accurately depict Waymo's
20 solution to the problem, apparently copied by the Fuji design. Removing certain diodes from
21 certain boards results not only in decreased resolution as discussed above, but also results in zones
22 of constant angular spacing. This is because the '190 patent, one-diode per PCB design, is
23 fundamentally based on the [REDACTED] In other
24 words, because [REDACTED] to the extent another PCB is removed, the designer
25 eventually reaches a point where the [REDACTED] This is illustrated in
26 Dr. McManamon's annotated Figure 5 [REDACTED]
27 [REDACTED] [REDACTED] [REDACTED]
28 [REDACTED] [REDACTED] [REDACTED]

1 [REDACTED] [REDACTED] [REDACTED] [REDACTED]
 2 [REDACTED] Even the '190 patent's passing suggestion (at 6:61-7:7) of placing several
 3 emitters per board does not remove the inherent limitation on the system that results from having
 4 the boards themselves as [REDACTED].

5 13. Waymo's designs, by contrast, are not so restricted, with [REDACTED]
 6 [REDACTED]
 7 [REDACTED]
 8 [REDACTED]. By using [REDACTED]
 9 [REDACTED] in accordance with the constraints imposed by the [REDACTED]
 10 [REDACTED], as is the case in the Velodyne '190 patent), Waymo
 11 (and Uber) are able to achieve [REDACTED].

12 14. Dr. Lebby briefly opines (Lebby Decl. ¶¶ 38-39) that the [REDACTED] of the
 13 GBr3 laser diodes is well-known and has previously been used in LiDAR systems. Dr. Lebby
 14 cites the same references (the PanDAR reference and the '190 patent) as Dr. McManamon, and I
 15 disagree with Dr. Lebby's opinion for the same reasons I disagree with Dr. McManamon's
 16 opinion regarding the same subject, as discussed above. In addition, I note that the two images
 17 provided in paragraph 61 of Dr. Lebby's declaration depicting a GBr3 and a Fuji transmit board
 18 look very similar, suggesting direct or derivative use of Waymo's [REDACTED]
 19 trade secret in the Fuji design.

20 15. Other than Waymo and Uber's LiDAR systems, I am not aware of any other
 21 LiDAR system that includes [REDACTED]
 22 [REDACTED]
 23 [REDACTED]. My opinion therefore remains that Waymo's unique
 24 [REDACTED] is a trade secret and that Uber uses that trade secret.

25 16. ***Uber did not independently develop*** [REDACTED]. I understand
 26 that Dr. McManamon contends that Uber independently developed the [REDACTED] of the Fuji
 27 system based on work by Mr. Boehmke prior to Uber's acquisition of Anthony Levandowski's
 28 company Otto. (McManamon Decl. ¶¶ 41-48.) For the reasons set forth below, I believe these

1 conclusions are flawed, and I have seen no evidence that Mr. Boehmke independently developed
 2 the [REDACTED]
 3 [REDACTED]
 4 [REDACTED] for the Fuji system.

5 17. Dr. McManamon opines that [REDACTED], Mr.
 6 Boehmke worked on developing [REDACTED] for Uber's self-driving
 7 cars." (McManamon Decl. ¶ 43.) Dr. McManamon further opines that in [REDACTED]
 8 [REDACTED], Mr. Boehmke "pulled together the design options he previously considered" and developed
 9 the "[REDACTED]" and that the "positioning and orientation of the diodes on
 10 the transmit board of the Fuji design" were ultimately "based" on Mr. Boehmke's work. (*Id.* ¶
 11 48.) However, Dr. McManamon explained at his deposition that [REDACTED]
 12 [REDACTED]
 13 [REDACTED]. (Jaffe Reply Decl. Ex. 83, 4/19/2017 McManamon Depo. Tr. at
 14 45:17-47:4.)

15 18. I also note that neither Mr. Boehmke nor Mr. Haslim ever unequivocally state
 16 in their declarations that Mr. Boehmke's work (at any time) was the basis for the current Fuji
 17 design. The most Mr. Boehmke is willing to say is that [REDACTED]
 18 [REDACTED] that he prepared on [REDACTED] (Ex. I) was "provided to" James Haslim and
 19 that Mr. Boehmke "understand[s] that James [Haslim] and his team used the data in this summary
 20 to generate the initial optical cavity designs and transmit PCBs designs for the Fuji design."
 21 (Boehmke Decl. ¶ 18.) Mr. Haslim also states that he "understands" Mr. Boehmke to have
 22 provided such information. (Haslim Decl. ¶ 6.) But, Mr. Haslim never explains how—or even
 23 whether—the information provided by Mr. Boehmke was used. Later, Mr. Haslim states that
 24 Exhibit B to his declaration "is a true and correct copy of the [REDACTED]
 25 [REDACTED]" of the Fuji system, but here he makes no connection between
 26 Exhibit B and any of the work that Mr. Boehmke allegedly provided in [REDACTED]. (*Id.* ¶
 27 15.)
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1 19. Based on my independent analysis of the evidence, I conclude that the [REDACTED]
 2 [REDACTED] of the Fuji design could not have been independently developed by Mr.
 3 Boehmke prior to his exposure to Otto, because the designs Mr. Boehmke was considering at this
 4 time were very different. For example, the [REDACTED] depicted at paragraph 8 of the
 5 Boehmke Declaration and at paragraph 43 of the McManamon Declaration do not show a
 6 [REDACTED], but rather [REDACTED]
 7 [REDACTED]. While the [REDACTED]
 8 [REDACTED], they are [REDACTED].
 9 Also the [REDACTED] in the sense that the [REDACTED]
 10 [REDACTED]. As discussed
 11 previously, this type of [REDACTED] is distinct from the [REDACTED]
 12 [REDACTED] that Waymo claims as a trade secret and which Uber is currently using in its Fuji design.

13 20. I also note that there is no corroborating evidence that between November 2015 to
 14 March 2016, Mr. Boehmke ever considered positioning [REDACTED].
 15 While the figure shown at paragraph 12 of Mr. Boehmke's declaration shows lasers being emitted
 16 from a curved source, it is possible this figure merely corresponds to an approach similar to that
 17 described in the '190 patent, with an array of evenly spaced, one-diode PCBs, which themselves
 18 are positioned within a curved frame. Again, as previously discussed, this is distinct from
 19 Waymo's concept and the current Fuji design of [REDACTED]
 20 [REDACTED].

21 21. The first document provided by Mr. Boehmke that shows any recognition of the
 22 ability to [REDACTED] is Exhibit H which is dated [REDACTED]. Here,
 23 Mr. Boehmke describes, [REDACTED] that would involve [REDACTED]
 24 [REDACTED]
 25 [REDACTED] (Boehmke Decl. Ex. H at 10.) In this document, Mr. Boehmke describes
 26 [REDACTED]
 27 [REDACTED] (*Id.*)

1 22. Importantly, at around this same time, I have reviewed documents produced by
2 Uber that indicate Mr. Boehmke's [REDACTED] was developed
3 at time that he and Uber were collaborating with Otto and Mr. Levandowski in particular. For
4 example, on [REDACTED]
5 [REDACTED] (Jaffe Reply Decl. Ex. 72,
6 UBER00008543.) Subsequent documents show that Mr. Boehmke, Mr. Levandowski, and others
7 at Otto were working closely on designs [REDACTED]. (Jaffe Reply Decl.
8 Ex. 98, UBER00008553; Jaffe Reply Decl. Ex. 99, UBER00008557; Jaffe Reply Decl. Ex. 97,
9 UBER00008494.)

10 23. For all of these reasons, I disagree that the evidence shows that Uber independently
11 developed the [REDACTED] trade secret in the Fuji design. In my opinion, the
12 available evidence does not directly indicate how or where Uber derived this concept, confirming
13 my earlier opinion that it was derived from Uber's exposure to Waymo's confidential trade secrets
14 through both Otto and Mr. Levandowski.

21 24. As I wrote [REDACTED]
22 [REDACTED]
23 [REDACTED] optimal spacing and, to preserve [REDACTED] between the [REDACTED] on the
24 receive block and the [REDACTED] on the transmit block, Waymo used [REDACTED] in the
25 transmit block. (Droz Decl. ¶ 22; TS List Nos. 2-3.) Waymo determined that the [REDACTED]
26 [REDACTED] included [REDACTED] on each of the [REDACTED] and [REDACTED] on each of
27 the [REDACTED]. (TS List No. 3.) [REDACTED] is a trade secret. (TS List Nos.
28 2-3.)

1 25. **Use by Defendants.** Defendants have confirmed that, like GBr3, the Fuji LiDAR
 2 uses [REDACTED], and that [REDACTED] contain [REDACTED] and [REDACTED]
 3 [REDACTED] contain [REDACTED]. (Haslim Decl. ¶ 13.)

4 26. Dr. Lebby opines that Defendants' Fuji LiDAR system does not make use of
 5 Waymo's Trade Secret Nos. 2 and 3. First, with respect to Trade Secret No. 2, Dr. Lebby takes a
 6 very narrow view of what [REDACTED], arguing that the [REDACTED]
 7 [REDACTED], and that because of this, the [REDACTED] are really [REDACTED]
 8 [REDACTED] (Lebby Decl. ¶¶ 29-45.) The Fuji system, as a whole, [REDACTED], and
 9 viewed as a [REDACTED] there is [REDACTED]
 10 [REDACTED]. In that [REDACTED], as Dr. Lebby recognizes, there are [REDACTED] distributed
 11 across [REDACTED], with [REDACTED]. (Lebby Decl. ¶ 44.)
 12 Accordingly, it is my opinion that the Fuji system practices or at least is derived from Trade Secret
 13 No. 2, which requires a [REDACTED] transmit block comprised of [REDACTED], with [REDACTED]
 14 [REDACTED].

15 27. Even under Dr. Lebby's narrow view, it is still my opinion that the Fuji device uses
 16 Trade Secret List No. 2. The Fuji device simply takes the [REDACTED] and [REDACTED]
 17 [REDACTED] while still maintaining the same number of [REDACTED] and the same distribution of
 18 [REDACTED]. At most, this is a minor modification derived from Waymo's trade secret
 19 design that does not change the fundamental arrangement of components.

20 28. Next. Dr. Lebby takes the view that Uber's Fuji system does not use Trade Secret
 21 No. 3 because it arranges its [REDACTED] in [REDACTED] rather than in [REDACTED]
 22 [REDACTED]. However, this too is only a minor modification in the arrangement [REDACTED]
 23 [REDACTED] that does not change the fact that Defendants have derived their design from Waymo's trade
 24 secret. It is my understanding that minor modifications, elaborations, or even improvements
 25 cannot absolve the Defendants from liability if the ultimate design is derived from Waymo's trade
 26 secret information. Uber has not provided any explanation or analysis to show that simply
 27 [REDACTED] changes the fundamental operation of the overall device, and I
 28 am not aware of any. Nor have Defendants provided any evidence to rebut my view that this

1 design is simply the result of starting with the configuration claimed in Trade Secret 3 and slightly
 2 [REDACTED].

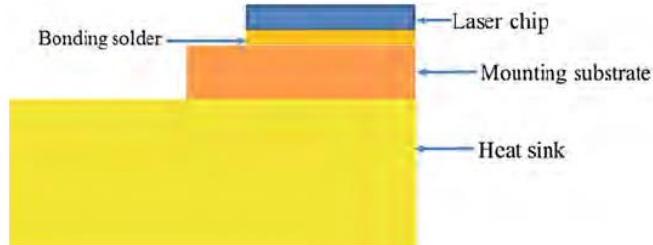
3 29. ***Qualification as Trade Secret.*** Dr. Lebby further opines that a [REDACTED]
 4 [REDACTED] is just one of the few workable configurations for the transmit block of any [REDACTED].
 5 (Lebby Decl. ¶ 30.)

6 30. In my opinion, Dr. Lebby's analysis generally relies on hindsight, starting from his
 7 knowledge of Waymo's trade secrets to reason that those trade secrets were "one of a few
 8 workable configurations." (Lebby Decl. ¶ 30.) It is clear that Waymo's specific solution to the
 9 problem of optimizing a LiDAR system for self-driving car applications is not generally known to
 10 the public or in the field, and Dr. Lebby has not cited evidence to show that any has or would
 11 arrive at Waymo's specific designs. Dr. Lebby's attempt to discount the relevance of alternative
 12 arrangements of [REDACTED] as not ideal (Lebby Decl. ¶ 33) is not supported by the
 13 evidence. In fact, James Haslim explained in his declaration that [REDACTED]
 14 [REDACTED] and [REDACTED]
 15 [REDACTED]. (Haslim Decl. ¶ 11.) Waymo's GBr2 design used [REDACTED].
 16 The fact that Waymo's solution placed [REDACTED] and [REDACTED] is a novel and
 17 unexpected design and therefore a valuable trade secret, as outlined in my Original Declaration.
 18 (Kintz Decl. ¶¶ 36-43.)

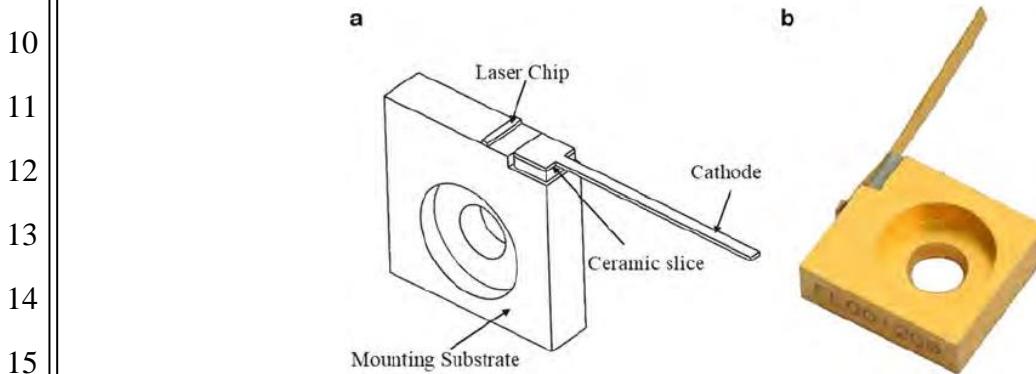
19 31. Dr. Lebby's reliance on Xingsheng Liu's "Packaging of High Power
 20 Semiconductor Lasers" is misplaced. Liu's textbook is addressed to general principles of
 21 semiconductor laser packaging and does not specifically relate to LiDAR or other optical laser
 22 system design. Indeed, as a person of skill in the art of laser-based optical mapping systems, I
 23 would have referenced such semiconductor packaging literature for general principles but would
 24 not draw from such references any conclusions regarding what was possible or feasible in
 25 implementing the detailed design for a complex laser-based optical system such as a LiDAR
 26 system.

27 32. As outlined by Liu, semiconductor packaging involves placing the thin patterned
 28 semiconductor material that makes up an integrated circuit (i.e., the chips), such as a laser diode

1 chip, together with components in a package that can be used as part of a larger circuit, with
 2 cathodes and anodes for making connections from the chip to the larger circuit in which the chip
 3 will be used. For example, this is depicted in Figures 2.1 and 2.2 of Liu:



8 **Fig. 2.1** Basic structure of a semiconductor laser [1]



16 **Fig. 2.2** The typical C-mount packaging structure and a picture of a C-mount laser device [1, 3]

17 33. As Liu explains, a laser diode package could include laser bars (such as depicted in
 18 Figure 2.17) or laser stacks (such as depicted in Figure 2.27).

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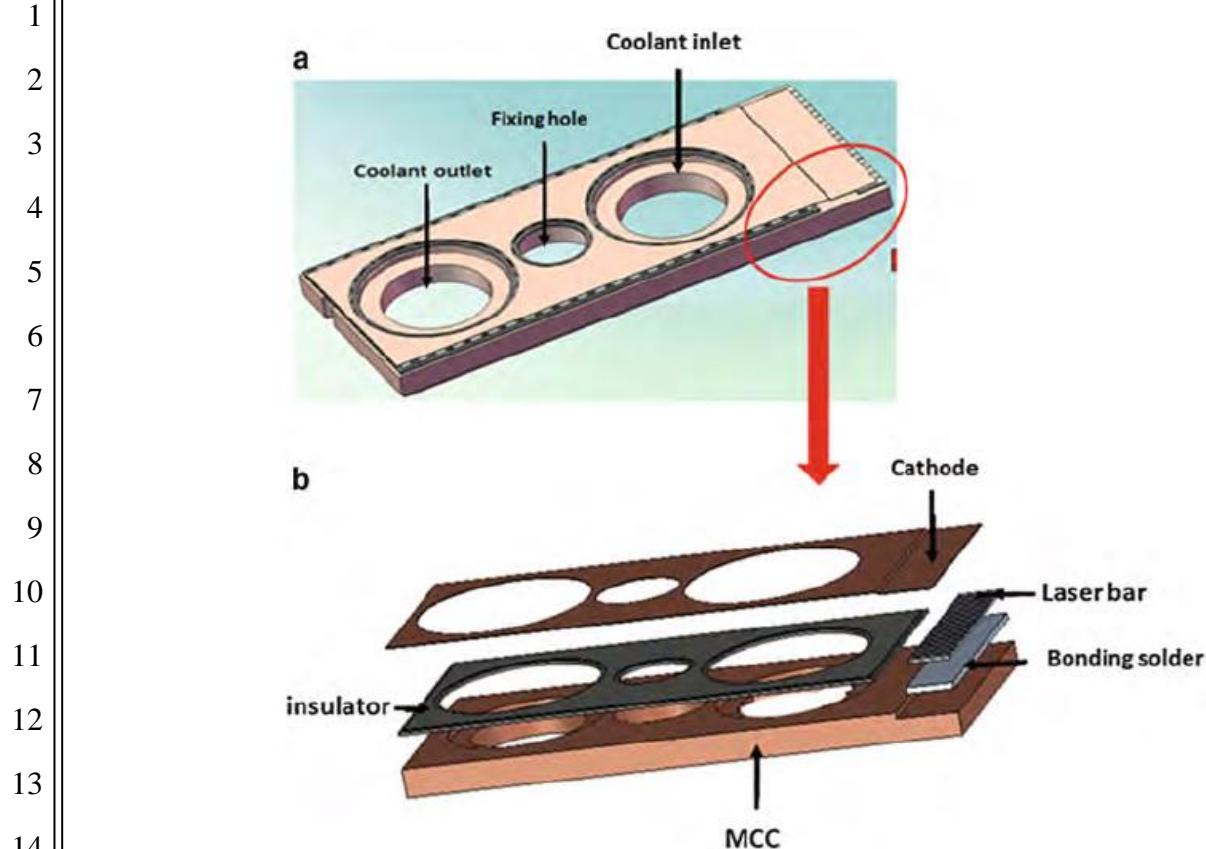


Fig. 2.17 The packaging structure of a MCC laser bar [13]

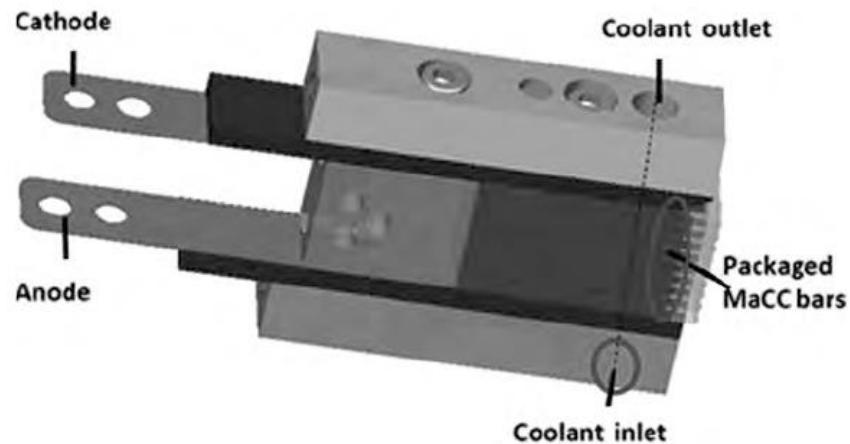


Fig. 2.27 The V-stack semiconductor laser packaged by MaCC laser bars [16]

34. As Dr. Lebby noted in his deposition, laser bars are “a single piece of semiconductor.” (Jaffe Reply Decl., Ex. 84, Lebby Depo. Tr. at 52:21-22.) Moreover, packaged laser bars, and packaged laser stacks composed of multiple laser bars stacked on top of each other, are not “singulated” emitters, in that they do not produce a single output beam but instead produce

1 separate lines (Jaffe Reply Decl., Ex. 84, Lebby Depo. Tr. at 52:23-53:1), as depicted in Figures
 2 5.4(b) and 5.6 of Liu, reproduced below. [REDACTED]

3 [REDACTED], as Dr. Lebby recognized in his deposition. (Jaffe Reply Decl., Ex. 84, Lebby
 4 Depo. Tr. at 53:2-4.)



10 **Fig. 5.4** The radiation and the near-field pattern of an 808 nm semiconductor laser bar [11]. (a)
 11 The radiation of a semiconductor laser bar. (b) The near-field pattern of a semiconductor laser bar

12 **Fig. 5.6** The far-field
 13 pattern of a semiconductor
 14 laser stack with fast axis
 15 collimation [11]



19 35. Nowhere does Liu teach what I have seen in both Waymo's GBr design and Uber's
 20 Fuji system, namely the [REDACTED]

21 [REDACTED]. In fact, nowhere does Liu use the word "PCB" or "board," which was Dr.
 22 Lebby's own word used to describe the laser stack in Liu Figure 5.5 noted in his deposition. (Jaffe
 23 Reply Decl. 84, Lebby Depo. Tr. at 52:15-17.) This is not surprising, as Liu is not directed to the
 24 use of laser diodes in optical systems such as a LiDAR system, but is directed merely to packaging
 25 laser diodes for potential subsequent use in larger circuits. Indeed, Waymo's GBr3 Tx Board
 26 Engineering Requirements Specification document describes [REDACTED]

1 [REDACTED] (P. 6.) Other than GBr and Fuji, I have
 2 not seen an optical system use [REDACTED].

3 36. Accordingly, Dr. Lebby's reliance on Figure 5.5 of Liu, in which a laser stack is
 4 depicted, is misplaced. Figure 5.5 depicts laser bars stacked directly on top of each other, with the
 5 anode of the top-most stack serving as the cathode of the middle stack and the anode of the middle
 6 stack serving as the cathode of the bottom stack. Figure 5.5 does not teach anything about using
 7 [REDACTED], in which the stacking does not provide the
 8 electrical connections to the laser diodes and requires use of the proprietary [REDACTED]
 9 developed by Waymo.

10 [REDACTED]
 11 [REDACTED]
 12 [REDACTED]
 13 [REDACTED]
 14 [REDACTED]
 15 [REDACTED]
 16 [REDACTED]
 17 [REDACTED]
 18 [REDACTED]
 19 [REDACTED]

20 37. As I stated in my Original Declaration (Kintz. Decl. ¶¶ 44-48), Waymo's
 21 completed PCB design files for [REDACTED] are proprietary design specifications from which
 22 Defendants most likely adapted the Fuji PCB designs.

23 38. **Use by Defendants.** Dr. Lebby opines that it is not reasonable to infer that the Fuji
 24 PCB was adapted from Waymo's PCB design files. (Lebby Decl. ¶¶ 59-62). I disagree. Dr.
 25 Lebby states that the [REDACTED], but makes no
 26 attempt to quantify this statement. Thus, he does not counter my opinion that the Fuji PCB
 27 appears to be [REDACTED] of the GBr3 design files downloaded by Anthony Levandowski.
 28 As previously stated, I compared the [REDACTED] against the Fuji PCB by

1 [REDACTED] and measuring the [REDACTED] by
 2 each PCB. The ratio of the [REDACTED]
 3 [REDACTED] Stated a different way, for each PCB, the ratio between the
 4 distance to the [REDACTED]
 5 [REDACTED]. (Kintz Decl. ¶ 47.) This demonstrates that the Fuji PCB [REDACTED]
 6 [REDACTED] to mimic the [REDACTED] of the Waymo board, [REDACTED]
 7 [REDACTED].

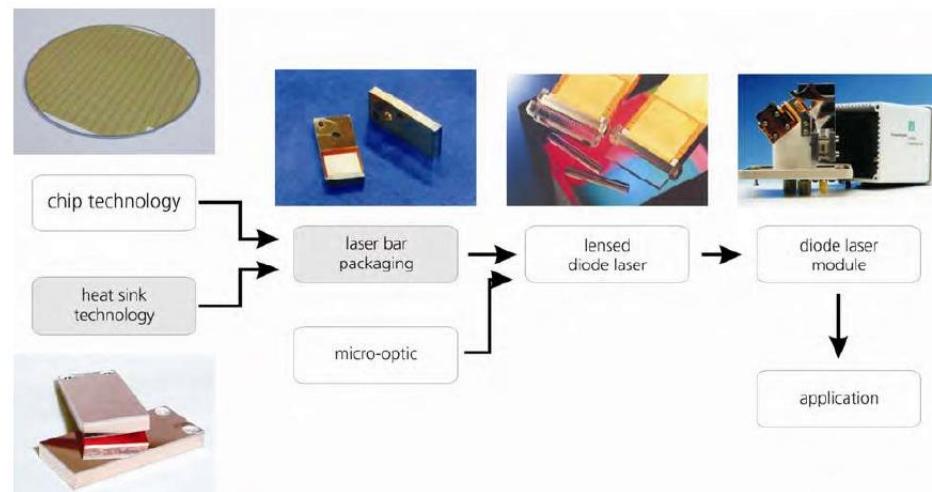
8 39. *Qualification as Trade Secret.* Neither Dr. McManamon nor Dr. Lebby dispute
 9 that Waymo's detailed design schematics are confidential Waymo trade secrets.

10 [REDACTED]
 11 [REDACTED]
 12 [REDACTED]
 13 40. As I stated in my Original Declaration (Kintz Decl. ¶¶ 49-53), Waymo positions its
 14 [REDACTED], rather than [REDACTED]. Known
 15 LiDAR systems strive to [REDACTED] for heat
 16 dissipation, but Waymo [REDACTED] to ensure that [REDACTED]
 17 [REDACTED], while at the same time allowing space to [REDACTED]
 18 [REDACTED] to both [REDACTED] with respect to the plane of the PCB.

19 (TS List Nos. 7, 9.)

20 41. *Use by Defendants.* Dr. Lebby does not deny that the Fuji PCB [REDACTED]
 21 [REDACTED]. At Dr. Lebby's deposition, he testified that based on his discussion with Uber engineer
 22 James Haslim, [REDACTED]. (Jaffe
 23 Reply Decl. 84, Lebby Depo. Tr. at 58:16-23; *see also* Jaffe Reply Decl. 68, Haslim Depo. Tr. at
 24 64:49.) This [REDACTED] (which is atypical in the field) is the same amount that the
 25 [REDACTED] in Waymo's system. Thus, Defendants are not simply using Waymo's
 26 [REDACTED] trade secret, they are [REDACTED]
 27 [REDACTED]
 28 [REDACTED]

1 42. **Qualification as Trade Secret.** Dr. Lebby opines that [REDACTED]
 2 [REDACTED] “is a known design choice” and therefore cannot be a trade secret. (Lebby
 3 Decl. ¶ 46-51.) However, Dr. Lebby again relies on the Liu textbook, as well as a 2007
 4 dissertation (Christian Scholz, *Thermal and Mechanical Optimization of Diode Laser Bar*
 5 *Packaging*), in the field of semiconductor laser packaging. Again, as an optical engineer, I would
 6 consult semiconductor laser packaging literature for only general principles and would not draw
 7 from such references any conclusions regarding what was possible or feasible in implementing the
 8 detailed design for a complex laser-based optical system such as a LiDAR system. Also, I have
 9 seen no evidence that Uber or Otto relied on this or any other similar publications to design their
 10 LiDAR system. Indeed, Scholz shows that the laser bar packaging to which the dissertation is
 11 directed is three steps removed from the application, such as building a LiDAR system, and is
 12 closer to (and one step away from) semiconductor wafer chip technology.



21 Figure 1-2: Value-added chain for diode laser bars

22 43. Moreover, both Liu and the Scholz dissertation teach away from using significant
 23 [REDACTED]. Indeed, as Dr. Lebby notes, Liu describes [REDACTED] as undesirable
 24 features in semiconductor packaging. (Lebby Decl. ¶ 49.) However, Dr. Lebby omits Figure
 25 7.50, showing Liu’s [REDACTED] from his
 26 declaration. I reproduce that Figure below.

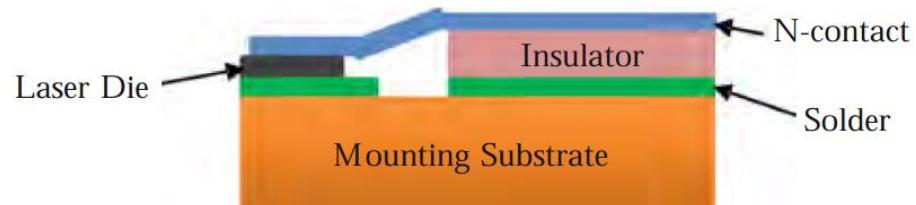


Fig. 7.50 Ideal alignment between the diode laser die and the mounting substrate [1]

44. The Scholz dissertation also does not teach Waymo's trade secret of [REDACTED]
 [REDACTED]. Scholz discusses [REDACTED] laser bars (i.e., strips of
 semiconductor material containing rows of laser diode emitters) [REDACTED] of the heat sink
 when packaging it all together. However, Scholz notes that the [REDACTED]
 [REDACTED] which again teaches away from the trade secret. As discussed above, however, both
 Waymo's GBr3 LiDAR system and Uber's Fuji LiDAR system [REDACTED]
 [REDACTED] on which they are mounted. This is [REDACTED]
 [REDACTED]
 [REDACTED]

45. I also note that Dr. Lebby ignores the additional very important benefit of
 [REDACTED] described in my Original Declaration, which is that it enables [REDACTED]
 [REDACTED]
 [REDACTED], which is directly relevant to LiDAR applications. (Kintz Decl.
 ¶ 50.)

46. As I stated in my Original Declaration (Kintz. Decl. ¶¶ 54-55), Waymo specifies
 that [REDACTED] in each PCB. A [REDACTED] through [REDACTED]
 [REDACTED] ensures that [REDACTED], and Waymo directs for its laser diodes to be
 positioned [REDACTED]. (*Id.*) Thus, [REDACTED] must be placed with maximum precision.

47. *Use by Defendants.* Dr. Lebby does not deny that Defendants [REDACTED]
 [REDACTED] In addition, Waymo engineer Asheem Linaval

1 testified that the Fuji PCB contains [REDACTED]
 2 [REDACTED] (Jaffe Reply Decl. Ex. 65, Linaval Depo. Trans. at 59:4-12.)

3 48. Dr. Lebby stated that the Fuji PCB uses [REDACTED]
 4 [REDACTED] (Lebby Decl. ¶ 58.) However, Exhibit B to the
 5 Haslim Declaration discloses [REDACTED]
 6 [REDACTED] (Haslim Decl. Ex. B.) These points are referenced [REDACTED]
 7 [REDACTED] (*Id.*) This tells me that Defendants use [REDACTED]
 8 [REDACTED]—one of which is squarely within Waymo’s trade secret
 9 design.

10 49. ***Qualification as Trade Secret.*** Dr. Lebby opines that “the concept of [REDACTED]
 11 [REDACTED] and positioning laser
 12 diodes [REDACTED]” is not a trade secret because neither of these concepts are trade
 13 secrets. (Lebby Decl. ¶¶ 52-58.) In my opinion, Dr. Lebby mischaracterizes the nature of this
 14 trade secret. This trade secret is formulated as [REDACTED]
 15 [REDACTED]
 16 [REDACTED]
 17 [REDACTED] (TS List No. 14.) This
 18 trade secret is an [REDACTED] comprised of three elements: (1) [REDACTED]
 19 [REDACTED]; (2) using [REDACTED] for placement of
 20 the laser diodes; and (3) [REDACTED]. Dr. Lebby
 21 attempts to divide this trade secret into its component parts and claim that each component part
 22 was known, but the trade secret as practiced by Waymo is the combination of all elements in one
 23 technique for [REDACTED].

24 50. None of the references cited by Dr. Lebby are in the field of LiDAR, and none of
 25 the references disclose the unique combination of elements into a technique for [REDACTED]
 26 [REDACTED] as claimed by Waymo so as to maintain the precise [REDACTED]
 27 [REDACTED] relative to each other notwithstanding significant [REDACTED]
 28 [REDACTED] for PCBs. As Waymo engineer Pierre-Yves Droz

1 explained in his deposition, this trade secret is about [REDACTED]
 2 [REDACTED]. (Jaffe Reply Decl. Ex. 90, Droz
 Depo. Tr. at 129:10-131:16.)

3 The references Dr. Lebby cites do not achieve this important result.

4 51. Specifically, U.S. Patent No. 4,244,109 discloses only holes for mounting a single
 5 PCB onto a frame. ('109 patent at 1:66-68.) Nowhere does it disclose more than one PCB, much
 6 less [REDACTED]

7 [REDACTED], as required by this trade secret. Indeed, Dr. Lebby testified that the
 8 '109 patent shows only one printed circuit board. (Jaffe Reply Decl. Ex. 84, Lebby Depo. Tr. at
 9 69:15-19.)

10 52. The German patent application No. DE 3031103 does not disclose [REDACTED]
 11 [REDACTED], nor is it in the field of LiDAR or even in
 12 the wider optics field. Instead, it discloses holes made under solder bosses or tracks on PCBs so
 13 that, “[w]hen the translucent multi-layer board is held up against a strong light source, the
 14 positions of the solder bosses relative to the bored holes can be clearly seen.” (DE 3031103 at
 15 Abstract.) This describes a visual alignment technique, which would be less than ideal in a
 16 LiDAR system requiring [REDACTED]
 17 [REDACTED], as required by this trade secret. Dr.
 18 Lebby testified that the German patent application [REDACTED]
 19 [REDACTED] (Jaffe Reply Decl. Ex. 84, Lebby Depo. Tr. 73:14.)

20 53. Finally, U.S. Patent No. 4,432,037, which is also not in the LiDAR or optics fields,
 21 discloses only the use of “location holes which fix a reference point” as well as “a reference line”
 22 to position conductive patterns on a single PCB. ('037 patent at 1:57-60.) Nowhere does it
 23 disclose [REDACTED]
 24 [REDACTED]

25 54. Accordingly, the technique for [REDACTED]
 26 [REDACTED] is
 27 Waymo’s unique solution to the problem of [REDACTED] to each
 28

1 other while [REDACTED] and is thus Waymo's trade
 2 secret.

3 **II. TRADE SECRETS NOT DISCUSSED IN MY ORIGINAL DECLARATION**

4 55. In this section I address trade secrets that I did not discuss in my Original
 5 Declaration. I discuss them in my Reply Declaration because new evidence has become available
 6 since March 10, 2017. I note that this list of trade secrets is not exhaustive, and I reserve the right
 7 to analyze and offer opinions about additional trade secrets as further evidence is provided.

8 [REDACTED]
 9 [REDACTED]
 10 [REDACTED]
 11 [REDACTED]

12 56. *Use by Defendants.* My visual inspection of the Uber Fuji device confirmed that
 13 Uber is using [REDACTED]
 14 [REDACTED]. This is apparent from the fact that [REDACTED], and [REDACTED]
 15 [REDACTED] ensure that the diode is [REDACTED].

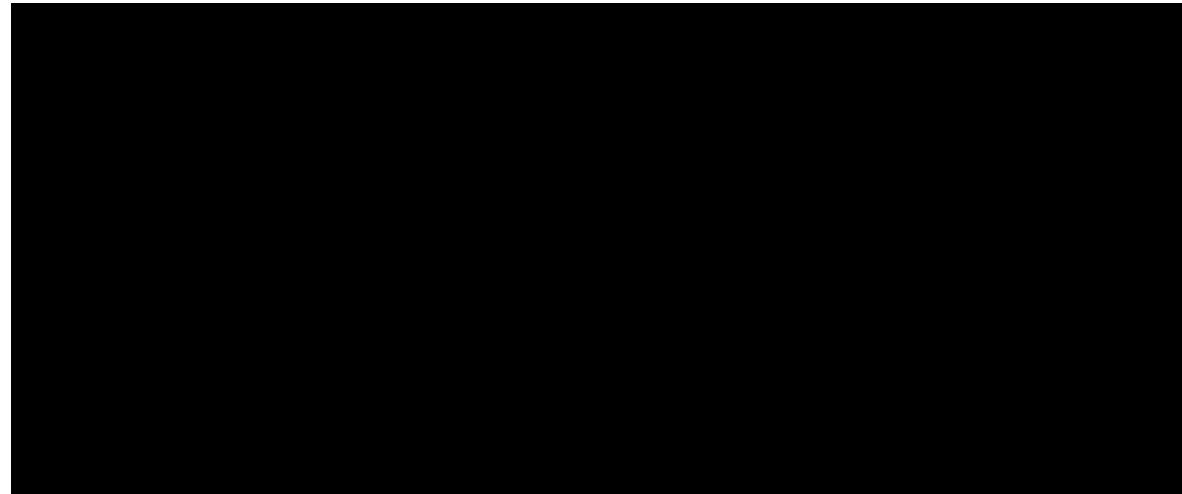
16 57. *Qualification as Trade Secret.* Positioning the [REDACTED] such that they are [REDACTED]
 17 [REDACTED] is not generally known in the relevant field. As discussed earlier,
 18 PCB diodes for LiDAR applications almost always are positioned such that the [REDACTED]
 19 [REDACTED] by some distance. A placement that is [REDACTED]
 20 [REDACTED] has independent economic value because it allows [REDACTED]
 21 [REDACTED] and thus avoid having a portion of their [REDACTED]
 22 [REDACTED].

23 [REDACTED]
 24 [REDACTED]
 25 [REDACTED]
 26 58. *Use by Defendants.* Defendants do not deny that the Fuji LiDAR uses [REDACTED]
 27 [REDACTED]. Further, my visual inspection of the Fuji device confirmed

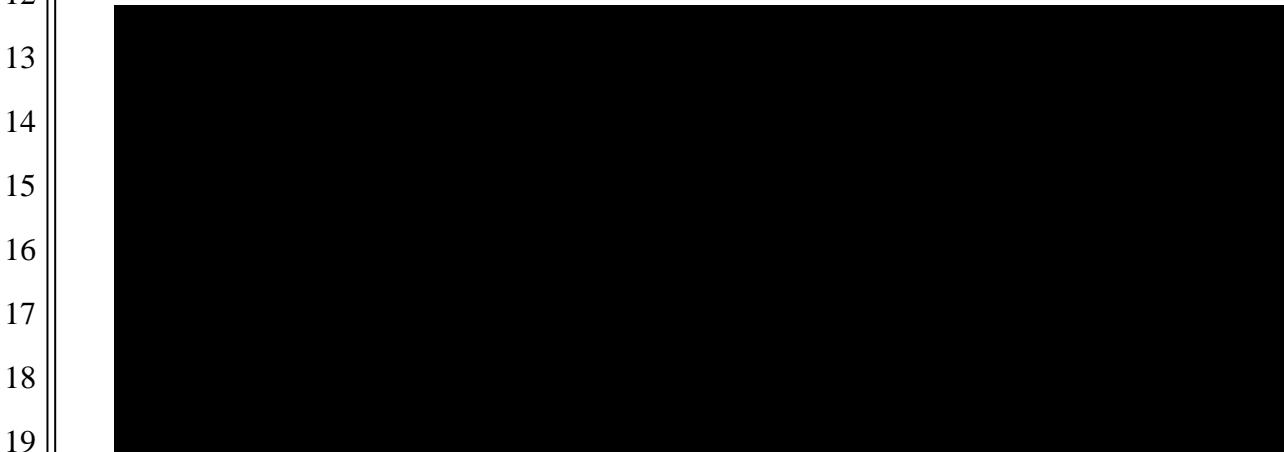
1 that such [REDACTED] on the Fuji board such that they are [REDACTED]

2 [REDACTED]. As is evident from the photographs below, [REDACTED]

3 [REDACTED].



12 (Jaffe Reply Decl. Ex. 95, UBER00006248.)



20 (Jaffe Reply Decl. Ex. 96, UBER00006251.)

21 59. In order to accommodate the [REDACTED], the [REDACTED] must be configured within
22 a larger [REDACTED]. Such a [REDACTED] requires a
23 [REDACTED] to ensure that the [REDACTED]
24 [REDACTED]. As shown below, the overall shape and configuration
25 of the [REDACTED] in Uber's Fuji design is nearly identical to that of Waymo's design, indicating
26 that the same [REDACTED] is being employed by Uber.

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Uber's**Waymo's**

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(Jaffe Reply Decl. Ex. 106, UBER00011612 (left); Jaffe Opening Decl. Ex. 2 at 15 (right)),.

60. Indeed, based on documents produced in this case, it is now clear that as early as

Otto engineers, with the involvement of Mr. Levandowski, contacted Waymo's confidential vendor for

(Jaffe Reply Decl. Ex. 104, UBER00011613.) In fact,

(*Id.*) By engineers at Otto

(Jaffe Reply Decl. Ex. 105, UBER00011263.) This evidence confirms that Uber is using Waymo's claimed trade secret 10.

61. ***Qualification as Trade Secret.*** The for Waymo's

qualifies as a trade secret. Providing a for each

requires a . Indeed, neither the Hamamatsu design, nor the Liu design cited by Dr. Lebby as characteristic of the prior art teach or suggest the required to accommodate the in Waymo's unique PCB configuration. The public domain cited by Dr. Lebby are , that appear to be simply .

1 62. Waymo's [REDACTED], on the other hand, requires a
 2 [REDACTED] in order to ensure each [REDACTED] is capable of precisely
 3 aligning the [REDACTED] with its [REDACTED]. The use of such a [REDACTED]
 4 [REDACTED] is atypical in the field, and would therefore not be generally known. It is
 5 therefore no surprise that the Otto engineers [REDACTED]
 6 [REDACTED].

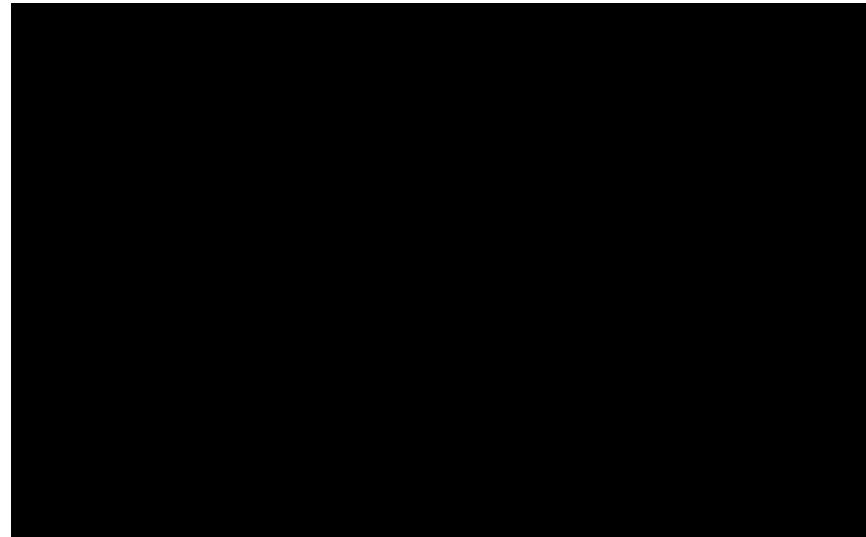
7 63. Waymo's manufacturing process for a [REDACTED] also derives independent
 8 economic value from not generally being known in the field. The [REDACTED] results in
 9 [REDACTED]. Moreover,
 10 the design allows for [REDACTED]
 11 [REDACTED].

12 [REDACTED]
 13 [REDACTED]
 14 [REDACTED]
 15 [REDACTED]

16 64. ***Use by Defendants.*** My visual inspection of the Fuji device confirmed the high
 17 likelihood that Defendants use this trade secret. This trade secret involves a technique for
 18 [REDACTED]. In order to ensure proper alignment of the
 19 optical components, the PCBs must generally [REDACTED]
 20 [REDACTED]. Thus, Waymo developed a [REDACTED]
 21 [REDACTED] of their corresponding PCB. These [REDACTED] thus ensure that the PCBs are
 22 precisely spaced and positioned.

23 65. During my physical inspection on April 11, 2017, I observed [REDACTED]
 24 [REDACTED]. The objects do not appear to be
 25 [REDACTED]
 26 [REDACTED]
 27 [REDACTED]
 28 [REDACTED]

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(Jaffe Reply Decl. Ex. 94, UBER00006246.)

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11 66. ***Qualification as Trade Secret.*** This trade secret is not generally known in the
12 relevant field of technology. I am not aware of any other LiDAR system that uses such [REDACTED]
13 [REDACTED] in order to ensure proper alignment of the optical equipment. Waymo's trade secret also
14 derives independent economic value because it simplifies the assembly of the LiDAR devices and
15 avoids the painstaking process of having to precisely align individual optical components. This
16 technique provides Waymo a competitive advantage over competitors having no knowledge of the
17 technique.
18 [REDACTED]
19 [REDACTED]
20 [REDACTED]
21

22 67. ***Use by Defendants.*** Evidence produced since the filing of my original declaration
23 confirms that the Defendants use this trade secret. First, an email chain between Anthony
24 Levandowski, [REDACTED], and others demonstrates that as early as [REDACTED] (Jaffe Reply Decl. Ex.
25 100, UBER00011242.) In the first email of the chain, [REDACTED]
26 [REDACTED]
27 [REDACTED] (*Id.*) In a follow up email, [REDACTED]
28

1 [REDACTED]

2 (Id.) [REDACTED]

3 [REDACTED]

4 [REDACTED]

5 [REDACTED] (Id.)

6 68. My inspection of Uber's Fuji device confirmed that it is using Trade Secret No. 19.

7 [REDACTED]

8 [REDACTED] allows the device to [REDACTED]

9 [REDACTED] including the motherboard housed in
10 the fixed portion of the device. (Jaffe Reply Decl. Ex. 110, UBER00006261.)11 69. I note that Dr. McManamon addressed this trade secret, but did not dispute that
12 Uber uses it. (McManamon Decl. ¶ 63.)13 70. *Qualification as Trade Secret.* This trade secret is not generally known in the
14 relevant field of technology. I am not aware of any other LiDAR system that includes a [REDACTED]

15 [REDACTED]

16 [REDACTED]

17 [REDACTED]. Dr. McManamon's

18 declaration states that this design is "commonplace," but does not cite any evidence to support that
19 argument. (McManamon Decl. ¶ 63.) I disagree with Dr. McManamon's characterization.

20 71. Waymo's trade secret also derives independent economic value because it allows

21 Waymo's LiDAR system to [REDACTED]

22 [REDACTED] without interfering with the device's ability to rotate and therefore take 360-degree
23 measurements.

24 [REDACTED]

25 [REDACTED]

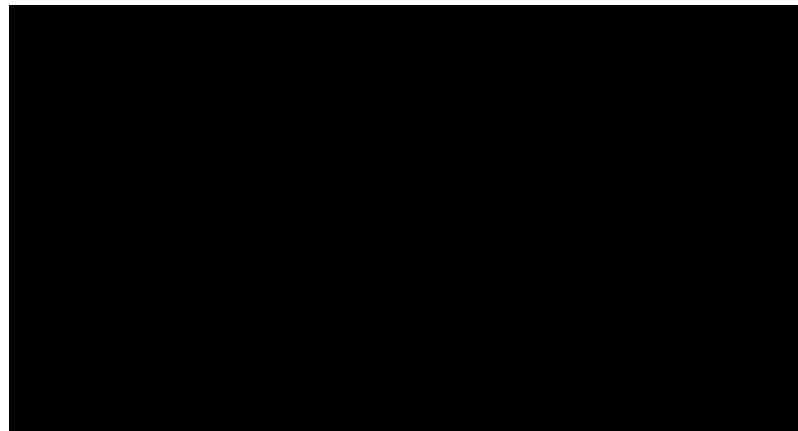
26 [REDACTED]

27 [REDACTED]

28 [REDACTED]

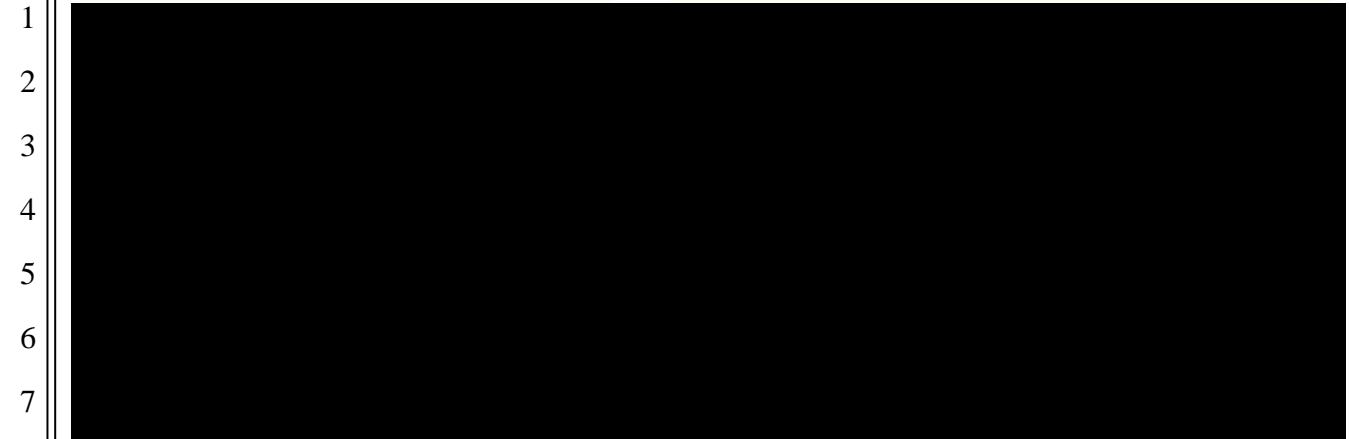
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2 72. ***Use by Defendants.*** My review of the relevant documentation in this case,
3 including documents produced by Uber indicates a high likelihood that Uber has or is currently
4 using Google's trade secret concepts relating to [REDACTED]

5 73. As part of its next generation hybrid medium- and long- range LiDAR system,
6 Waymo developed a specific design involving a [REDACTED]
7 [REDACTED] is depicted in, for example,
8 the schematic provided below:



16 (Jaffe Opening Decl. Ex. 18 at 7.)

17 74. Uber's document production indicates that Odin Wave (a predecessor to Tyto
18 LiDAR, which was subsequently acquired by Otto) was developing schematics involving a similar
19 [REDACTED]. For example, the schematic
20 shown at UBER00005076 [REDACTED]
21 [REDACTED]
22 [REDACTED] These documents therefore indicate that Odin
23 Wave/Tyto LiDAR was developing the same [REDACTED] as was being
24 developed at Waymo. [REDACTED] was then made available to Otto and Uber as its schematics
25 were produced from Uber's custodial files.



9 (Jaffe Reply Decl. Ex. 92, UBER00005076 (left), UBER00005077 (right).)

10 75. A physical inspection of Uber's [REDACTED] LiDAR device provides further support
11 for my conclusion that Uber acquired, and was seeking to leverage, Waymo's [REDACTED]
12 [REDACTED] Although I have not yet had the opportunity to
13 personally inspect the [REDACTED] device, photographs from an April 19, 2017 inspection, such as those
14 set forth below, indicate that this device is using [REDACTED]
15 [REDACTED]

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23 (Jaffe Reply Decl. Ex. 101, UBER00011676 (left); Jaffe Reply Decl. Ex. 107, UBER00011678
24 (right).)

25 76. Additionally, to implement [REDACTED] like that described in
26 Waymo's documents and embodied by Uber's [REDACTED] system, a person of skill in the art would
27 understand that it would be desirable to [REDACTED]
28 [REDACTED]

1 [REDACTED] Waymo

2 Trade Secret No. 48 relates to Waymo's time and effort to discover the appropriate [REDACTED]

3 [REDACTED]

4 77. The documents produced in this case show that Otto/Uber is seeking to leverage

5 Waymo's research into [REDACTED]. For example, [REDACTED], in response to an

6 email regarding [REDACTED], Anthony Levandowski responded

7 [REDACTED]

8 [REDACTED]

9 [REDACTED] Otto engineer Sameer Khirshagar testified at his deposition that Mr. Levandowski was

10 [REDACTED] used in

11 Uber's " [REDACTED]" LiDAR system. (Jaffe Reply Decl. Ex. 91, Khirshagar Dep. at 34:6-37:4.)

12 78. *Qualification as Trade Secret.* Waymo's [REDACTED]

13 implemented with an [REDACTED] is unique, and not generally known

14 in the relevant field. Waymo's implementation requires a [REDACTED] using [REDACTED]

15 [REDACTED] and it is [REDACTED]

16 [REDACTED] that allow the [REDACTED]

17 79. Waymo's [REDACTED] technique enabled by its [REDACTED]

18 [REDACTED] derives independent economic value by virtue of the fact that it is not generally known in

19 the field. Achieving this [REDACTED] greatly simplifies the overall circuitry

20 and makes the design less expensive. Moreover, the use of [REDACTED] allows [REDACTED]

21 [REDACTED]

22 [REDACTED] The ability to design a LiDAR device leveraging this technology is a competitive

23 advantage to the extent that others in the relevant field do not possess the knowledge of Google

24 circuit design and [REDACTED] approach.

25 **III. THE '922 AND '464 PATENTS**

26 80. Since my Original Declaration, I have inspected the Fuji system and reviewed the

27 limited technical documentation made available by Defendants related to that system. While I

28 believe my original opinions were reasonable based on the information then available, the newly

1 provided information requires me to withdraw my opinion that the Fuji system infringes the '922
 2 and '464 patents. I reserve the right to re-allege that this system infringes these patents at a later
 3 date if new evidence becomes available supporting such an opinion.

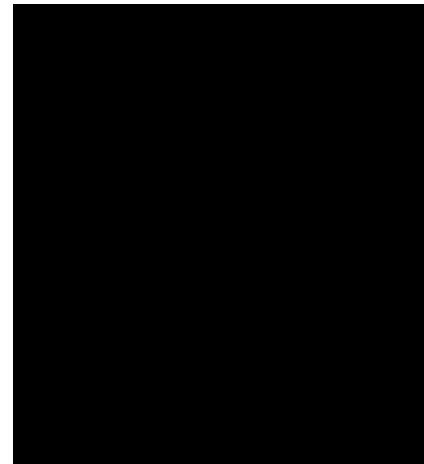
4 81. Since my original declaration, Defendants have produced documents and testimony
 5 regarding another of their LiDAR designs, called [REDACTED]. I have not yet had an opportunity to
 6 personally inspect the [REDACTED] device, but I have reviewed available documentation, deposition
 7 testimony, and photographs of the [REDACTED] system in forming my opinions herein.

8 82. As discussed in my original declaration, Otto filed a submission with the Nevada
 9 Department of Motor Vehicles on September 19, 2016, indicating that it was developing and/or
 10 deploying an "In-house custom built 64-laser (Class 1) emitting 6.4 million beams a second at 10
 11 Hz." It is my opinion that this device most likely corresponds to the [REDACTED] device that the
 12 Defendants recently made available for inspection. Like the device described in the Nevada
 13 submission, the [REDACTED] device is designed to include [REDACTED] positions [REDACTED]
 14 [REDACTED]. The [REDACTED], and are
 15 considered [REDACTED]. I understand Defendants have represent that the [REDACTED] device was
 16 designed to [REDACTED] rather than 6.4 million as disclosed in the Nevada
 17 submission; however, it would not be surprising if Otto changed this target over time, or increased
 18 the rotational frequency of the device in order to obtain a comparable amount of data. The
 19 development timeline for the [REDACTED] and Fuji devices supports my conclusion that the Nevada
 20 submission was referring to the [REDACTED] device. Otto filed the submission on September 19, 2016,
 21 and according to Mr. Haslim and Mr. Boehmke, Uber did not begin working on the Fuji device
 22 until late October 2016. Accordingly, [REDACTED] is the only device that I am aware of Otto
 23 developing at the time of the Nevada submission.

24 83. My opinion is that the available evidence suggests that there is a high likelihood
 25 [REDACTED] system [REDACTED]
 26 [REDACTED]
 27 [REDACTED]

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1 [REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Dep. at 45:22-48:15; Jaffe
 2 Reply Decl. Ex. 67, Boehmke Dep. at 44:8-45:14.)
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(Jaffe Reply Decl. Ex. 88, UBER00011654.)

84. Thus, it is my opinion that the [REDACTED] system infringes at least one claim of each the
 '922 and '464 patents, as shown in the exemplary claim charts set forth below.

'922 Patent	
Claim 1 Element	Evidence
a lens mounted to a housing, wherein the housing is configured to rotate about an axis and has an interior space that includes a transmit block, a receive block, a transmit path, and a receive path, wherein the transmit block has an exit aperture in a wall that comprises a reflective surface, wherein the receive block has an entrance aperture, wherein the transmit path extends from the exit aperture to the lens, and wherein the receive path extends from the lens to the entrance aperture via the reflective surface;	[REDACTED] (Boehmke Decl. Ex. H at 14 (“Rotate assembly at 20Hz”) (Mr. Boehmke testified that [REDACTED] [REDACTED] [REDACTED].” (Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 58:21-22.); (Jaffe Reply Decl. Ex. 87, UBER00011631.) [REDACTED] [REDACTED] [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 36:16-25.) [REDACTED] [REDACTED] [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 47:9-19; Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 44:8-45:14; Jaffe Reply Decl. Ex. 82, Gruver Depo.)

	Tr. at 67:15-22; Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 37:1-13.)
a plurality of light sources in the transmit block, wherein the plurality of light sources are configured to emit a plurality of light beams through the exit aperture in a plurality of different directions, the light beams comprising light having wavelengths in a wavelength range;	[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 46:18-20.) [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 82, Gruver Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H at 13-14.)
a plurality of detectors in the receive block, wherein the plurality of detectors are configured to detect light having wavelengths in the wavelength range; and	[REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 45:25-46:1; Jaffe Reply Decl. Ex. 82, Gruver Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H at 13.)
wherein the lens is configured to receive the light beams via the transmit path, collimate the light beams for transmission into an environment of the LIDAR device, collect light comprising light from one or more of the collimated light beams reflected by one or more objects in the environment of the LIDAR device, and focus the collected light onto the detectors via the receive path.	[REDACTED] [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 47:9-19; Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 44:8-45:14; Jaffe Reply Decl. Ex. 82, Gruver Depo. Tr. at 67:23-68:4.) [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 88, UBER00011654.)

'464 Patent	
Claim 1 Element	Evidence
a lens mounted to a housing, wherein the housing is configured to rotate about an axis and has an interior space that includes a transmit block, a receive block, a transmit path, and a receive path, wherein the transmit block has an exit aperture, wherein the receive block has an entrance aperture, wherein the transmit path extends from the exit aperture to the lens, wherein the receive path extends from the lens to the entrance	[REDACTED] [REDACTED] (Boehmke Decl. Ex. H at 14 ("Rotate assembly at 20Hz") (Mr. Boehmke testified that [REDACTED]) [REDACTED] (Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 58:21-22.); (Jaffe Reply Decl. Ex. 87, UBER00011631.) [REDACTED]

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	<p>aperture, and wherein the transmit path at least partially overlaps the receive path in the interior space between the transmit block and the receive block;</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 36:16-25.)</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 37:1-16.)</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim 47:9-19; Jaffe Reply Decl. Ex. 67, Boehmke 44:8-45:14; Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 37:1-16.)</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim 47:20-48:8; Jaffe Reply Decl. Ex. 67, Boehmke 45:8-14; Jaffe Reply Decl. Ex. 82, Gruver 67:15-18; Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 37:14-38:8.)</p>
17 18 19 20 21 22 23 24 25 26	<p>a plurality of light sources in the transmit block, wherein the plurality of light sources are configured to emit a plurality of light beams through the exit aperture in a plurality of different directions, the light beams comprising light having wavelengths in a wavelength range;</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 46:18-20.)</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 82, Gruver Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H at 13-14.)</p> <p>a plurality of detectors in the receive block, wherein the plurality of detectors are configured to detect light having wavelengths in the wavelength range; and</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 45:25-46:1; Jaffe Reply Decl. Ex. 82, Gruver Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H at 13.)</p>

1 wherein the lens is configured to receive the
 2 light beams via the transmit path, collimate
 3 the light beams for transmission into an
 4 environment of the LIDAR device, collect
 5 light comprising light from one or more of
 6 the collimated light beams reflected by one or
 7 more objects in the environment of the
 8 LIDAR device, and focus the collected light
 9 onto the detectors via the receive path.

[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim
 Depo. Tr. at 47:9-19; Jaffe Reply Decl. Ex.
 67, Boehmke Depo. Tr. at 44:8-45:14; Jaffe
 Reply Decl. Ex. 82, Gruver Depo. Tr. at
 67:23-68:4.) [REDACTED]

[REDACTED] (Jaffe
 Reply Decl. Ex. 88, UBER00011654.)

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 10 85. I reserve the right to provide more detailed opinions about infringement of the '922
 11 and '464 patents by the [REDACTED] system after further discovery on that system.

12 I declare under penalty of perjury that the foregoing is true and correct.

13 DATED: April 21, 2017

14 /s/ Gregory Kintz
 15 Gregory Kintz

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SIGNATURE ATTESTATION

Pursuant to Local Rule 5-1(i)(3), I attest under penalty of perjury that concurrence in the filing of this document has been obtained from Gregory Kintz.

/s/ Charles K. Verhoeven
Charles K. Verhoeven